

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims:

1-34 (Canceled)

35. (New) A method of storing values in local variables used by a virtual machine, said method comprising:

receiving a first sequence of bytecodes to be executed by said virtual machine, wherein said first sequence of bytecodes is selected from a defined first set of executable virtual machine instructions implemented to conform with a virtual machine specification that includes said defined first set of executable virtual machine instructions;

selecting, at load time, a first-reduced instruction from a reduced set of virtual machine instructions, wherein said first-reduced instruction represents two or more different virtual machine instructions in said first sequence of virtual machine instructions, the virtual machine being arranged to execute the reduced set of virtual machine instructions that provide substantially all of the functionality provided by said defined first set of virtual machine instructions, and wherein every one of the instructions in said defined first set of virtual machine instructions can be represented by at least one of the virtual machine instructions in the reduced-set of virtual machine instructions, and wherein said reduced-set of virtual machine instructions consists of a number of virtual machine instructions which is less than the number executable virtual machine instructions in said defined first set of virtual machine instructions;

translating, at load time, said two or more different virtual machine instructions, in said first sequence of bytecodes, into said first-reduced instruction from said reduced set of virtual machine instructions;

determining, after said translating, a second sequence of bytecodes that includes said first-reduced instruction, thereby representing said first sequence of bytecodes with said second sequence that includes at least said first-reduced instruction from said reduced-set of virtual machine instructions replacing said two or more different virtual machine instructions in said first sequence;

determining, at load time, whether said second sequence of bytecodes includes a Getfield instruction immediately followed by an Astore instruction, wherein said Getfield and Astore instructions are selected from said reduced set of virtual machine instructions;

determining, at load time, a macro instruction that represents said Getfield instruction and said Astore instruction that immediately follows said Getfield instruction;

loading into said virtual machine prior to execution time, said macro instruction instead of said Getfield instruction and said Astore instruction; and

executing said macro instruction to store a value into a local variable.

36. (New) A method as recited in claim 35, wherein said virtual machine internally represents instructions as a pair of streams.

37. (New) A method as recited in claim 36,

wherein said pair of streams includes a code stream and a data stream,

wherein said code stream is suitable for containing a code portion of said macro instruction, and

wherein said data stream is suitable for containing data.

38. (New) A method as recited in claim 37,

wherein said macro instruction is determined only when said virtual machine determines that said macro instruction should be determined.

39. (New) A method as recited in claim 38, wherein said determination of whether said macro instruction should be determined is made based on the number of times.

40. (New) A method as recited in claim 39, wherein said predetermined criteria is whether said Getfield instruction is immediately followed by said Astore instruction more than a predetermined number of times.

41. (New) A method as recited in claim 35, wherein said macro instruction is determined during a bytecode verification phase.

42. (new) A computer system for storing values into local variables used by a virtual machine, wherein said computer system operates to:

receive a first sequence of bytecodes to be executed by said virtual machine, wherein said first sequence of bytecodes is selected from a defined first set of executable virtual machine instructions implemented to conform with a virtual machine specification that includes said defined first set of executable virtual machine instructions;

select, at load time, a first-reduced instruction from a reduced set of virtual machine instructions, wherein said first-reduced instruction represents two or more different virtual machine instructions in said first sequence of virtual machine instructions, the virtual machine being arranged to execute the reduced set of virtual machine instructions that provide substantially all of the functionality provided by said defined first set of virtual machine instructions, and wherein every one of the instructions in said defined first set of virtual machine instructions can be represented by at least one of the virtual machine instructions in the reduced-set of virtual machine instructions, and wherein said reduced-set of virtual machine instructions consists of a number of virtual machine instructions which is less than the number executable virtual machine instructions in said defined first set of virtual machine instructions;

translate, at load time, said two or more different virtual machine instructions, in said first sequence of bytecodes, into said first-reduced instruction from said reduced set of virtual machine instructions;

determine, after said translating, a second sequence of bytecodes that includes said first-reduced instruction, thereby representing said first sequence of bytecodes with said second sequence that includes at least said first-reduced instructions from said reduced-set of virtual machine instructions replacing said two or more different virtual machine instructions in said first sequence;

determine, at load time, whether said second sequence of bytecodes includes a Getfield instruction immediately followed by an Astore instruction, wherein said Getfield and Astore instructions are selected from said reduced set of virtual machine instructions;

determine, at load time, a macro instruction that represents said Getfield instruction and said Astore instruction that immediately follows said Getfield instruction;

load into said virtual machine prior to execution time, said macro instruction instead of said Getfield instruction and said Astore instruction; and

execute said macro instruction to store a value into a local variable.

43. (New) A computer system as recited in claim 42, wherein said macro instruction is generated during a bytecode verification phase.

44. (New) A computer system as recited in claim 42,

wherein said pair of streams includes a code stream and a data stream,

wherein said code stream is suitable for containing a code portion of said macro instruction, and

wherein said data stream is suitable for containing a data portion.

45. (New) A computer system as recited in claim 42, wherein said macro instruction is generated only when said virtual machine determines that said macro instruction should be generated.

46. (New) A computer system as recited in claim 45, wherein said determination of whether said macro instruction should be generated is made based on a predetermined criteria.

47. (New) A computer system as recited in claim 46, wherein said predetermined criteria is whether said Getfield instruction is immediately followed by said Astore instruction more than a predetermined number of times.

48. (New) A computer readable medium including computer program code for storing values into local variables used by a virtual machine, comprising:

computer program code for receiving a first sequence of bytecodes to be executed by said virtual machine, wherein said first sequence of bytecodes is selected from a defined first set of executable virtual machine instructions implemented to conform with a virtual machine specification that includes said defined first set of executable virtual machine instructions;

computer program code for selecting, at load time, a first-reduced instruction from a reduced set of virtual machine instructions, wherein said first-reduced instruction represents two or more different virtual machine instructions in said first sequence of

virtual machine instructions, the virtual machine being arranged to execute the reduced set of virtual machine instructions that provide substantially all of the functionality provided by said defined first set of virtual machine instructions, and wherein every one of the instructions in said defined first set of virtual machine instructions can be represented by at least one of the virtual machine instructions in the reduced-set of virtual machine instructions, and wherein said reduced-set of virtual machine instructions consists of a number of virtual machine instructions which is less than the number executable virtual machine instructions in said defined first set of virtual machine instructions;

computer program code for translating, at load time, said two or more different virtual machine instructions, in said first sequence of bytecodes, into said first-reduced instruction from said reduced set of virtual machine instructions;

computer program code for determining, after said translating, a second sequence of bytecodes that includes said first-reduced instruction, thereby representing said first sequence of bytecodes with said second sequence that includes at least said first-reduced instructions from said reduced-set of virtual machine instructions replacing said two or more different virtual machine instructions in said first sequence;

computer program code for determining, at load time, whether said second sequence of bytecodes includes a Getfield instruction immediately followed by an Astore instruction, wherein said Getfield and Astore instructions are selected from said reduced set of virtual machine instructions;

computer program code for determining, at load time, a macro instruction that represents said Getfield instruction and said Astore instruction that immediately follows said Getfield instruction;

computer program code for loading into said virtual machine prior to execution time, said macro instruction instead of said Getfield instruction and said Astore instruction; and

computer program code for executing said macro instruction to store a value into said local variable.

49. (New) A computer readable medium as recited in claim 48, wherein said macro instruction is generated during a bytecode verification phase.

50. (New) A computer readable medium as recited in claim 48,
wherein said pair of streams includes a code stream and a data stream,
wherein said code stream is suitable for containing a code portion of said macro
instruction, and
wherein said data stream is suitable for containing data.

51. (New) A computer readable medium as recited in claim 50, wherein said macro
instruction is generated only when said virtual machine determines that said macro
instruction should be generated.

52. (New) A computer readable medium as recited in claim 51, wherein said
determination of whether said macro instruction should be generated is made based on
a predetermined criteria.

53. (New) A computer readable medium as recited in claim 52, wherein said
predetermined criteria is whether said Getfield instruction is immediately followed by
said Astore instruction more than a predetermined number of times.